TPC-1240

RISC-based operator interface terminal with 12.1” flat panel display

Users Manual

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這是甲類的資訊產品，在居住的環境中使用時，
可能會造成射頻干擾，在這種情況下，使用者會
被要求採取某些適當的對策。

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FCC Class A

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy. If not installed and used in accordance with this user's manual, it may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Warning: *Any changes or modifications made to the equipment which are not expressly approved by the relevant standards authority could void your authority to operate the equipment.*

Packing List

In the whole set of TPC-1240 there are items as listed below:

- TPC-1240T-CE (or TPC-1240T-LNX) x 1 unit; the Windows CE (or Linux) operating system image is built in the flash memory on board.
- Accessory kit which includes:

1. Panel mounting clamps x 8 pieces
2. Panel mounting screws x 8 pieces
3. 3-pin power connector x 1 piece
4. Support CD x 1 piece
5. 1 meter 9-pin to 9-pin null modem cable x 1 piece
6. Microsoft Windows CE end user license agreement x 1 piece*[1]
7. TPC-1240 Linux resource CD x 1 piece *[2]

Remarks: *1. Only available in the model bundled with Windows CE OS*

2. Only available in the model bundled with Linux.

Additional Information and Assistance

1.Visit the Advantech web site at **www.advantech.com** where you can find the latest information about the product.
2.Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need
additional assistance. Please have the following information ready before you call:
•Product name and serial number
•Description of your peripheral attachments
•Description of your software (operating system, version, application software, etc.)
•A complete description of the problem
•The exact wording of any error messages

Safety Instructions

1. Read these safety instructions carefully.
2. Keep this User's Manual for later reference.
3. Disconnect this equipment from any AC outlet before cleaning. Use a damp cloth. Do not use liquid or spray detergents for cleaning.
4. For plug-in equipment, the power outlet socket must be located near the equipment and must be easily accessible.
5. Keep this equipment away from humidity.
6. Put this equipment on a reliable surface during installation. Dropping it or letting it fall may cause damage.
7. The openings on the enclosure are for air convection. Protect the equipment from overheating. DO NOT COVER THE OPENINGS.
8. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
9. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
10. All cautions and warnings on the equipment should be noted.
11. If the equipment is not used for a long time, disconnect it from the power source to avoid damage by transient overvoltage.
12. Never pour any liquid into an opening. This may cause fire or electrical shock.
13. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
14. If one of the following situations arises, get the equipment checked by service personnel:
    a. The power cord or plug is damaged.
    b. Liquid has penetrated into the equipment.
    c. The equipment has been exposed to moisture.
    d. The equipment does not work well, or you cannot get it to work according to the user's manual.
    e. The equipment has been dropped and damaged.
    f. The equipment has obvious signs of breakage.
15. DO NOT LEAVE THIS EQUIPMENT IN AN ENVIRONMENT WHERE THE STORAGE TEMPERATURE MAY GO BELOW -20° C (-4° F) OR ABOVE 60° C (140° F). THIS COULD DAMAGE THE EQUIPMENT. THE EQUIPMENT SHOULD BE IN A CONTROLLED ENVIRONMENT.

The sound pressure level at the operator's position according to IEC 704-1:1982 is no more than 70dB (A).

DISCLAIMER: This set of instructions is given according to IEC 704-1. Advantech disclaims all responsibility for the accuracy of any statements contained herein.

Wichtige Sicherheishinweise

1. Bitte lesen sie Sich diese Hinweise sorgfältig durch.
2. Heben Sie diese Anleitung für den späteren Gebrauch auf.
3. Vor jedem Reinigen ist das Gerät vom Stromnetz zu trennen. Verwenden Sie Keine Flüssig-oder Aerosolreiniger. Am besten dient ein angefeuchtetes Tuch zur Reinigung.
4. Die NetzanschluBsteckdose soll nahe dem Gerät angebracht und leicht zugänglich sein.
5. Das Gerät ist vor Feuchtigkeit zu schützen.
6. Bei der Aufstellung des Gerätes ist auf sicheren Stand zu achten. Ein Kippen oder Fallen könnte Verletzungen hervorrufen.
7. Die Belüftungsöffnungen dienen zur Luftzirkulation die das Gerät vor überhitzung schützt. Sorgen Sie dafür, daB diese Öffnungen nicht abgedeckt werden.
8. Beachten Sie beim. AnschluB an das Stromnetz die AnschluBwerte.
9. Verlegen Sie die NetzanschluBleitung so, daB niemand darüber fallen kann. Es sollte auch nichts auf der Leitung abgestellt werden.
10. Alle Hinweise und Warnungen die sich am Geräten befinden sind zu beachten.
11. Wird das Gerät über einen längeren Zeitraum nicht benutzt, sollten Sie es vom Stromnetz trennen. Somit wird im Falle einer Überspannung eine Beschädigung vermieden.
12. Durch die Lüftungsöffnungen dürfen niemals Gegenstände oder Flüssigkeiten in das Gerät gelangen. Dies könnte einen Brand bzw. elektrischen Schlag auslösen.
13. Öffnen Sie niemals das Gerät. Das Gerät darf aus Gründen der elektrischen Sicherheit nur von authorisiertem Servicepersonal geöffnet werden.
14. Wenn folgende Situationen auftreten ist das Gerät vom Stromnetz zu trennen und von einer qualifizierten Servicestelle zu überprüfen:
    a - Netzkabel oder Netzstecker sind beschädigt.
    b - Flüssigkeit ist in das Gerät eingedrungen.
    c - Das Gerät war Feuchtigkeit ausgesetzt.
    d - Wenn das Gerät nicht der Bedienungsanleitung entsprechend funktioniert oder Sie mit Hilfe dieser Anleitung keine Verbesserung erzielen.
    e - Das Gerät ist gefallen und/oder das Gehäuse ist beschädigt.
    f - Wenn das Gerät deutliche Anzeichen eines Defektes aufweist.

Der arbeitsplatzbezogene Schalldruckpegel nach DIN 45 635 Teil 1000 beträgt 70 dB(A) oder weiger.

DISCLAIMER: This set of instructions is given according to IEC704-1. Advantech disclaims all responsibility for the accuracy of any statements contained herein.

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CHAPTER 1

General Information

This chapter gives background information on the TPC-1240.

Sections include:

- Introduction
- Specifications
- LCD Specifications
- Touchscreen specifications
- Power
- I/O ports
- Mounting
- Exploded diagram
- Dimensions and cutout

Chapter 1 Introduction

1.1 Introduction

The TPC-1240 touch panel computer is an excellent product for HMI (Human Machine Interface). This 12.1" display operator interface is a RISC-based platform with these key features:

- All in one platform: the CPU, DRAM and Windows CE (or Linux) are integrated.

  Please refer to chapter 4 for details about Windows CE inside, and to chapter 5 for details about Linux.

- Slim but robust: the TPC-1240 is very thin (50 mm thickness) and lightweight (2.2 kg). This makes it the best solution for those applications that are tough in space or weak structural support.
- Cost effective: applying a high brightness TFT LCD with SVGA resolution (800 x 600). The TPC-1240 offers cost effective solution for operator interface terminals. With proper application programs it would give a comfortable graphic user interface (GUI) at this size of display.
- Fan-less and modular CPU board: the introduction of low power processor prevents this system from unreliable fans. In addition, the modular design facilitates the maintenance or possible upgrade on the CPU board.
- Powerful communication capability: the TPC-1240 provides serial ports and Ethernet communication. These two means of communication are the most welcomed ones in the field of industrial automation.
- Windows CE support: Advantech provides platform support for Windows CE. The operating system is built-in, the SDK for user-defined application programs are freely offered.
- Linux support: the TPC-1240 is also powered by Avamax iCava, which is a complete Linux package including kernel, development tools and source codes.

1.2 Specifications

1.2.1 System kernel (CPC-1110)

- CPU: Intel StrongARMTM SA1110 206 MHz RISC processor
- BIOS: there is no BIOS in RISC platform; similar functions are built on board directly
- VGA: MediaQ MQ200 VGA controller
- DRAM: built-in 32 MB SDRAM
- Ethernet: SMSC LAN91C96I 10Base-T Ethernet controller
- Watchdog timer: Dallas DS1670 watchdog timer; the time-out period is programmable by driver.
- Floppy diskette: the TPC-1240 does not provide floppy disk interface

1.2.2 I/O Ports

- 3 serial ports: 9-pin RS-232 (COM1), RS-485 (COM2) and 2-pin RS-232(COM3)
- 1 RJ-45 Ethernet port

1.2.3 Storage

- The primary storage device is the 16 MB built-in flash memory. The default Windows CE or Linux operating system is in this device.
- The TPC-1240 provides one CompactFlash card slot. This slot is for the storage of variety of Windows CE/Linux-based application programs.

1.2.4 Safety and Environment

Safety

- FCC class A and CE certificated
- BSMI certificated
- The front bezel is compliant with NEMA 4/IP65

Environment

- Operating temperature: 0~50° Celsius
- Storage temperature: -20~60° Celsius

- Humidity: 10 ~ 95% @ 40° Celsius relative humidity (non-condensing)
- Vibration: 10 ~ 18 Hz: 1.5 mm peak-to-peak displacement; 18 ~ 500 Hz: 1 G acceleration.

1.3 LCD Specifications

Display Type	TFT color LCD
Size (Diagonal)	12.1"
Maximum Resolution	800 x 600 (SVGA)
Maximum Colors	256k
Pixel pitch (WxH, mm)	0.31 x 0.31
Viewing angle	100
Luminance (cd/m²)	300
Contrast ratio	150 minimum
Operating temperature (°C)	0-50 (ambient)
VR control	Brightness adjustable
Backlight	2 CCFL
Backlight MTTF	50,000 hours

Table 1.1: LCD specifications

1.4 Touchscreen Specifications

Type	Resistive
Base glass construction	Tempered Glass
Resolution	Continuous
Light transmission	75% typical
Controller	PS/2 interface (simulated by SPI)
Power rating	3.3 to 5 V_{DC}
Software driver	Windows CE or Linux (Embedded)
Durability	100 million touches

Table 1.2: Touchscreen Specifications

1.5 Power

The TPC-1240 works by 24V_{DC} power input. The maximum current is about 0.8 A, and the nominal power consumption is 20 watts.

Note: In spite of the stated input voltage rating, the TPC-1240 can operate using 18 ~ 30 V_{DC}.

1.6 I/O Ports Arrangement

The TPC-1240 has 3 serial ports, 1 RJ-45 LAN port. The arrangement of these ports is shown in Figure 1.1

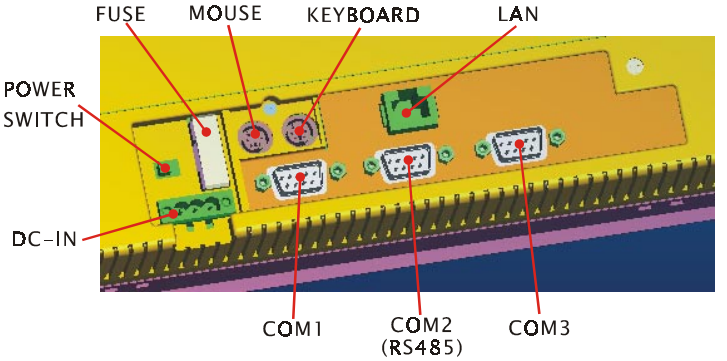

Figure 1.1: I/O Ports arrangement

1.7 Mounting

1.There is a piece of adhesive waterproof gasket on the plastic front bezel. Make sure the waterproof gasket is in position before install the TPC-1240 to the panel opening.
2.Install the TPC-1240 to the panel opening.
3.Find the eight clamps and eight long screws in the accessory pack. Hook those clamps to those holes around the four sides of the bezel. Insert the screws to every clamp and fasten them. These screws will then push on the mounting panel and fix the unit.
4.The mounting panel thickness is suggested to be less than 6 mm (0.236 inch).

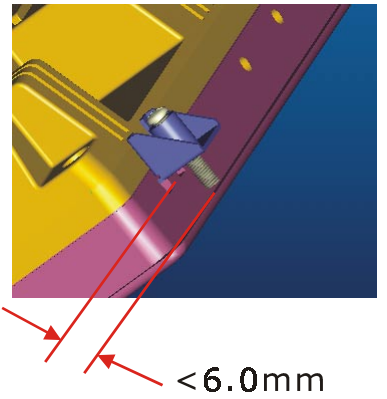

Figure 1.2: Panel mounting

1.8 Exploded diagram

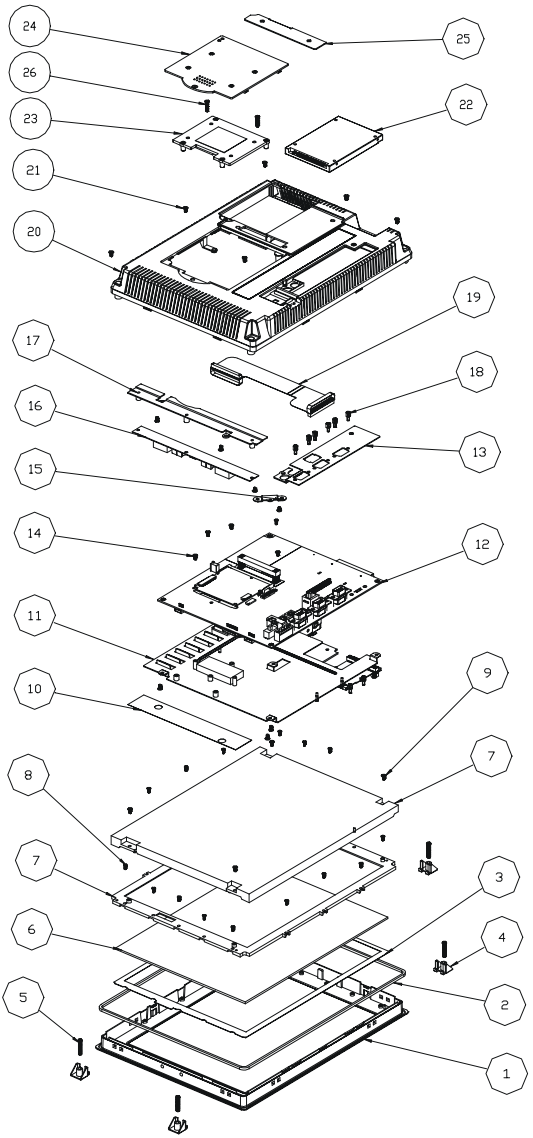

Figure 1.3: Exploded diagram

1.9 Dimensions and cutout

- Weight: 2.2 kg (without HDD)
- Dimension: 311 x 237 x 50 mm (W x H x D)
- Cutout: 302 x 228 mm (suggested)

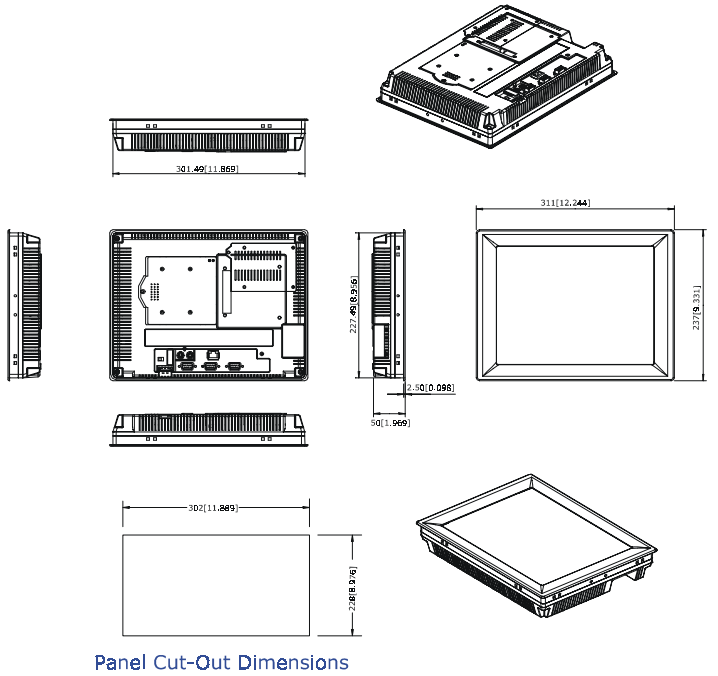

Figure 1.4: Dimensions and cutout

CHAPTER 2

System Quick Starting

This chapter provides a brief explanation for operating the TPC-1240.

Chapter 2 System Quick Starting

2.1 Unpacking and Powering up

Step 1

Unpack the TPC-1240 from its packaging. Please check the packing list at the beginning of this manual.

Figure 2.1: Opening the box

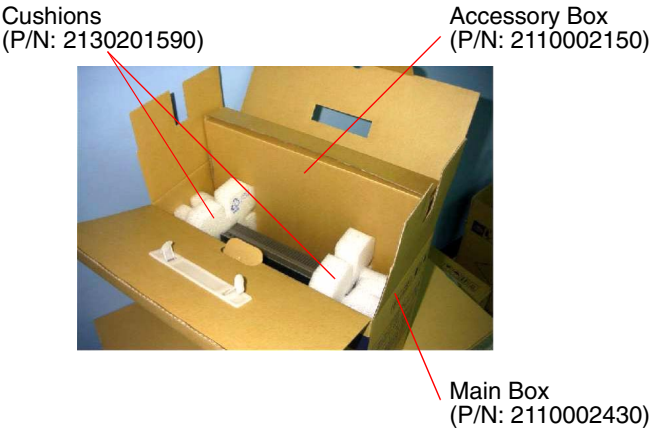

Figure 2.2: Unpacking the unit

Step 2

Insert a CompactFlash memory card containing Windows CE or Linux-based application program. Please refer to chapter 4 and 5 for building applications for the TPC-1240.

Warning: *The CompactFlash memory card is not hot swappable, it is recommended you turn off system power before installing the memory card. Thus, potential data loss can be avoided.*

Step 3

Connect the power connector to a 24 V_{DC} power source. The power source can either be from a power adapter or an in-house power source.

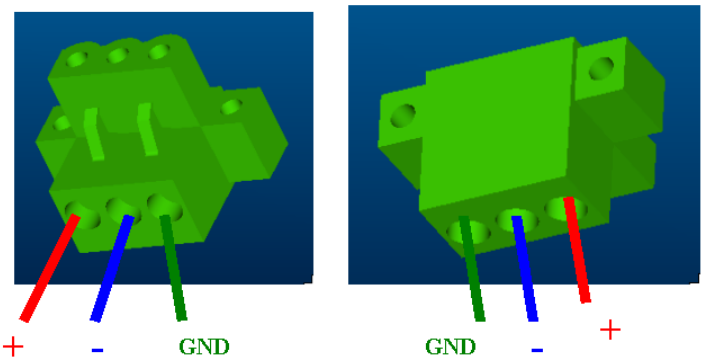

Figure 2.3: Power connector and power lines

Warning: *If the power source is not connected to the correct pins, the system may be damaged when the power is turned on.*

Step 4

Plug the power source to the system power supply.

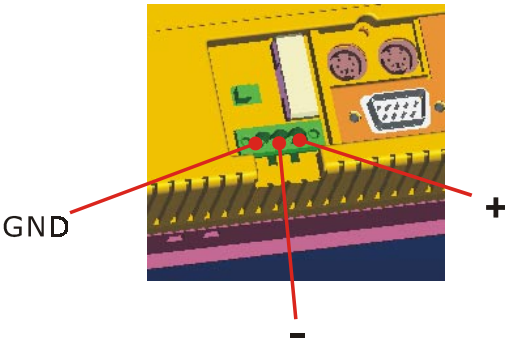

Figure 2.4: Power connector pin assignment

Step 5

Plug in the power lines and turn on the system power switch.

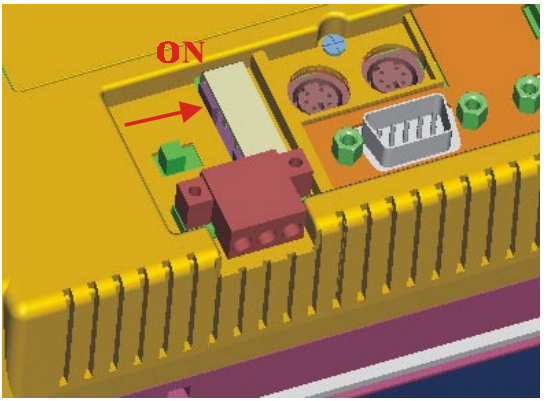

Figure 2.5: Plug in the power lines and turn on the power switch

Step 6

Calibrate the touchscreen. Detailed procedures are described in section 5.3 for Linux and section 6.2 for Windows CE.

CHAPTER 3

The Engine of the TPC-1240

This chapter briefly introduces the CPU board and the I/O board which comprise the system.

Chapter 3 The Engine of the TPC-1240

3.1 Passive backplane

The engine of the TPC-1240 is constructed by the combination of two PCBA—one main board and one I/O board. Such combination makes system customizing feasible.

3.2 CPC-1110 main board

	Description
J1	TPC-1240 LCD control bus

Table 3.1: CPC-1110 main board connector/jumper list

3.2.1 Connector pin assignments

Pin	Signal	Pin	Signal
1	#CAS1	26	#CAS2
2	#CAS3	27	DCK0
3	DCK1	28	CKE0
4	CKE1	29	DCK2
5	#SDCS3	30	#SDCS2
6	#SDCS1	31	JTAG_TCK
7	#SDCS0	32	JTAG_TDI
8	#SDRAS	33	JTAG_TMS
9	#SDCAS	34	JTAGTDO
10	#CAS0	35	#JTAGTRST

Table 3.2: Connector pin assignments

3.3 TPC-1240 I/O board

	Description
CN2	50-pin FPC connector
CN3	144-pin SODIMM connector
CN4	20-pin FPC connector
CN6/CN7	PS/2 keyboard and mouse connector
CN8	Ethernet 10Base-T RJ-45 connector
CN9	Power DC input connector
CN10/CN12	COM1/COM3 RS-232 ports
CN11	COM2 RS-485 serial Port (auto data flow control by Windows CE)
CN14	LCD connector
CN15	VGA connector
CN17	LCD inverter connector
CN18	CompactFlashTM socket 50-pin connector
JP200/JP201	Touchscreen interface connectors

Table 3.3: TPC-1240 I/O board connector/jumper list

	COM1 (9-pin RS-232)		COM3 (2-pin RS-232)
Pin	Signal	Pin	Signal
1	DCD	1	N/C
2	RXD	2	RXD
3	TXD	3	TXD
4	DTR	4	N/C
5	GND	5	GND
6	DSR	6	N/C
7	RTS	7	N/C
8	CTS	8	N/C
9	RI	9	N/C

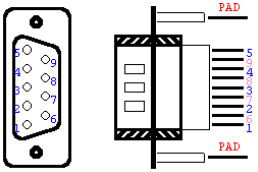

Table 3.4: TPC-1240 COM1/COM3 (RS-232) serial ports

Pin	Signal
1	DATA-
2	DATA+
3	N/C (TX232)
4	N/C (RX232)
5	GND
6	N/C
7	N/C
8	N/C
9	N/C

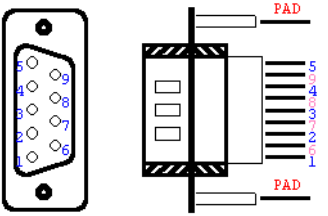

Table 3.5: TPC-1240 COM2 (auto flow control RS-485) serial port

Pin	Signal
1	12V
2	GND
3	ENABKL
4	VBR
5	N/C

Table 3.6: LCD inverter connector

Pin	Signal
1	24VDC(+)
2	24VDC(-)
3	GND

Table 3.7: Power connector

Pin	Signal	Pin	Signal
1	VDDSAFE5	2	VDDSAFE5
3	GND	4	GND
5	VDDSAFE3	6	VDDSAFE3
7	Vcon	8	GND
9	LCD_D0	10	LCD_D1
11	LCD_D2	12	LCD_D3
13	LCD_D4	14	LCD_D5
15	LCD_D6	16	LCD_D7
17	LCD_D8	18	LCD_D9
19	LCD_D10	20	LCD_D11
21	LCD_D12	22	LCD_D13
23	LCD_D14	24	LCD_D15
25	N/C	26	N/C
27	N/C	28	N/C
29	N/C	30	N/C
31	N/C	32	N/C
33	GND	34	GND
35	SHCLK	36	FLM
37	M/DE	38	LP
39	ENABKL	40	ENAVEE

Table 3.8: 16-bit LCD display connector

Pin	Signal
1	SENSE_XL
2	SENSE_XR
3	SENSE_YT
4	SENSE_YB

Table 3.9: Touchscreen interface connector

CHAPTER 4

Windows CE in the TPC-1240

Chapter 4 Windows CE in TPC-1240

4.1 Introduction

The TPC-1240 operator interface terminal is designed to serve on the Windows CE platform. The Windows CE is a compact operating system that occupies less storage space or system resources compared with other operating systems. By its modular nature, it is possible to choose those functions that are useful for specific application. Not only reducing the system resources required, it also reduces start-up time. In the field of industrial automation or for operator interface terminal, this is an appealing feature because the impact of downtime would be minimized. Furthermore, the small storage space it needs makes operating system on solid-state disk possible.

Notice: *Default Windows CE inside the TPC-1240 is the English version. Please contact Advantech local representatives for local language support.*

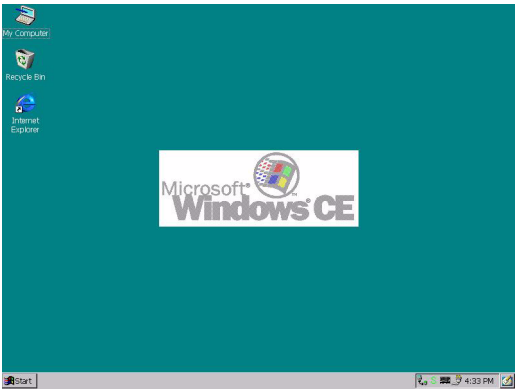

Figure 4.1: Windows CE on TPC-1240

4.2 TPC Utilities

There are several useful utilities built in the standard Windows CE OS of TPC-1240:

4.2.1 Soft-Keyboard

The TPC-1240 is dedicated to the small-sized operator interface. It is often inconvenient for users to attach a keyboard to such small machine. Thus, a software keyboard is embedded in the standard TPC-1240 OS. Upon boot-up, a small keyboard icon will appear on the status bar. Tap this icon by the stylus to activate/hide this Soft-keyboard.

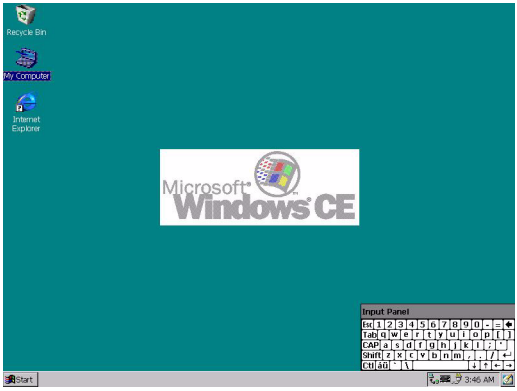

Figure 4.2: Soft-keyboard

4.2.2 TPC Configurator

TPC-1240 provides an integrated utility for users to make basic settings of the machine.

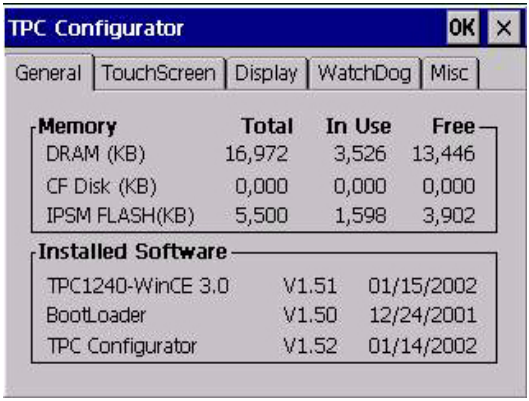

Figure 4.3: TPC Configurator

General information

As shown in the Figure 4.3, the first page of the TPC configurator gives the general information of the TPC-1240. Note that if there is no CompactFlash memory card is inserted, the figures shown will be zero for this item.

Notice the version numbers shown on this page. The format of the version number is: Va.bb.c

a: stands for the major version number. Only for structural revision of the OS will this number be changed.

bb: stands for minor version number. The first digit changes when substantial revision is made, while the second digit changes for minor revision.

c: stands for pre-release version. From time to time it is possible that users get such pre-release version to keep time-to-market. When this digit appears, it means that this version is built and tested by Advantech Windows CE R&D team. When such "beta" version finishes all necessary quality assurance procedure and get into mass production, this digit will be taken away.

Touchscreen calibration

The touchscreen calibration can be executed from the configurator.

TPC Configurator
OK
General
TouchScreen
Display
WatchDog
Misc
Welcome !!
Please click the following "Calibrate" Icon that will ask you to tap the target as their screen shown. This will ensure accurate touchscreen entry. While you finish the process, all touchscreen settup registry will be automatically saved to flash memory.
Calibrate

Figure 4.4: TPC Configurator

Tap the "Calibrate" button shown in the Figure 4.4, the calibration utility is activated. It allows users to adjust both tapping location and double tapping interval.

Figure 4.5: Calibrating Tapping location

Tapping the "Recalibrate" button, the screen will turn out to be white. A cross appears at the center of the screen. Use a stylus or finger to push the center of the cross until it moves. The cross moves to upper-left, lower-left, lower-right and upper-right corners. Push the center to give location references. When all five crosses are done, click "OK" button and the settings will be automatically saved to the registry.

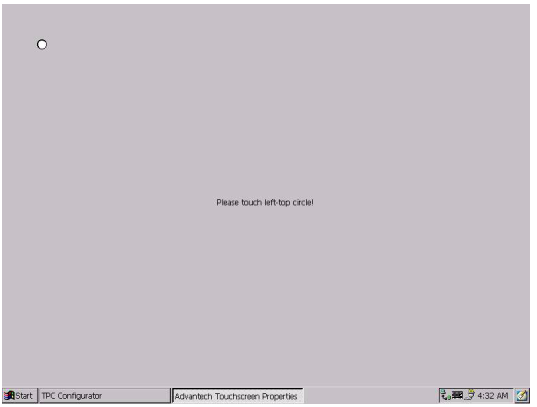

Figure 4.6: Screen for calibration

LCD Control

Display page of the TPC Configurator provides the function to turn off the LCD backlight, and thus elongates the period of service. For example, if the user wants the backlight turned off automatically after 10 seconds when the device was no longer used. The user must choose the “Turn off backlight after second”, type in “10” in the edit box and then press “Apply” button. Then the screen save function is enabled. In addition, users can click the “Off Now” button to turn off the backlight of the display panel immediately. Once the backlight was turned off, events or perturbations from the touchscreen can turn it on.

On the other hand, if users want to disable the screen save function, choose “Always On” radial button and press “Apply” button.

Figure 4.7: LCD control utility

Watchdog timer

It is important in industrial applications that the control systems are rarely down, or are capable of self-reset if they are halted somehow. The watch-dog timer is therefore used in the TPC-1240 to provide automatic reset. There is a timer inside the watchdog timer. The TPC-1240 should clear the timer within a pre-set time interval periodically. If the timer is not cleared, the timer would assume the system to be halted and generate a reset. The watchdog timer in the TPC-1240 provides eight different time intervals: 2 seconds, 5 seconds, 10 seconds, 30 seconds, 60 seconds, 2 minutes, 5 minutes and 10 minutes. Choose the appropriate time interval, and then press "Enable" button to enable the watchdog function. The "REBOOT" can immediately initiate a warm reboot.

Figure 4.8: Watchdog timer settings

The RTC TIME region shown at the lower area of the Figure 4.8 displays the time of watchdog timer (DS1670) and system time. Users can press "Start" button to show the current time.

Miscellaneous

The last page of the configurator provides several miscellaneous but important functions as described below. The buttons inside the "Registry" area provide registry saving and browsing function. The "SMC MAC ID" shows the network MAC address. The "HTTP Server Root" block is used to specify the root directory of http server. The default directory was "\Storage Card\", users can specify another directory by type the directory in the edit box and press "Set" button. The new setting would become effective after the system reboot. The buttons inside "COMM" area provides the communication functions including Activesync, IPConfig, and to ping Yahoo!.

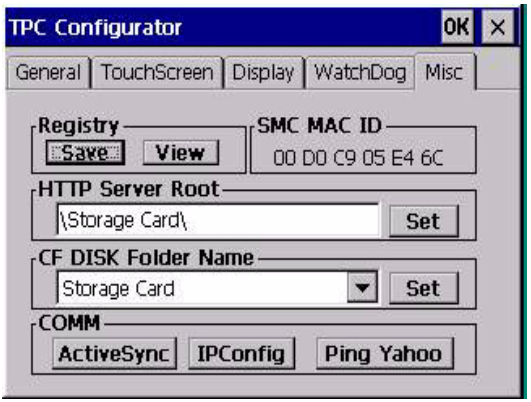

Figure 4.9: Miscellaneous

Notice: *There is a pull-down menu for users to set the folder name of the CompactFlash memory card. The default folder name is "Storage Card".*

Warning: *Do not try to key in folder name in the text box directly. If the CF is rename to some name that beyond the given list, there will be irreversible problem for users' application program settings.*

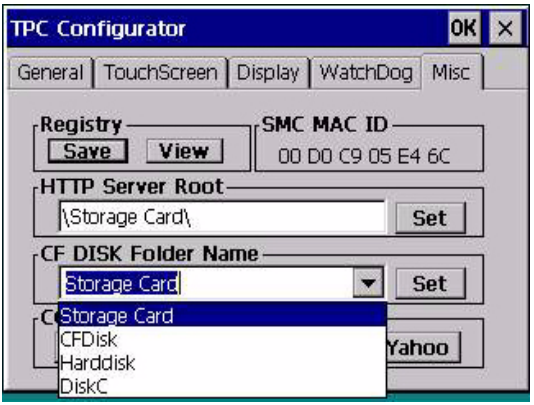

Figure 4.10: Default names for the CF card

4.2.3 Saving registry

The window of the regflash utility is shown as Figure 4.11. There are three options to handle the registry: to save registry on flashROM, to delete registry on flashROM and to save registry to CompactFlash card. Select the option and click "Save" button to activate.

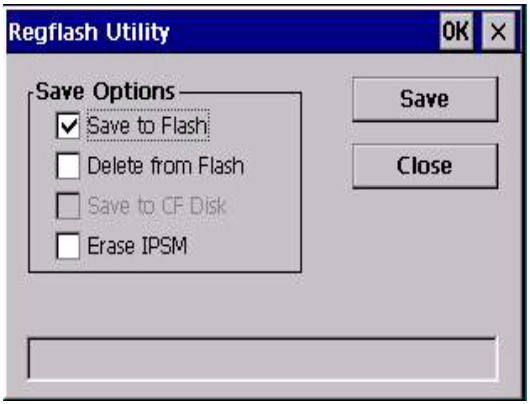

Figure 4.11: Regflash

Notice: *Do not select "Save" and "Delete" registry on flash at the same time. Such conflicting commands may cause unpredictable results.*

Warning: *If there is no CompactFlash card inserted in the CF slot, the option to save to CF disk will be disabled.*

The other function this utility can do is to wipe out the contents on the IPSM (Intel Persistent Storage Manager). Select this option and click "Save", the data stored in the IPSM (i.e., the spared space of the on-board flashROM) will be deleted.

Warning: *After the IPSM is erased, if the machine is restarted, it will hold for several minutes to format the IPSM. Do not turn off or interrupt the formatting otherwise the operating system will be corrupted.*

4.3 Networking

4.3.1 Networking via ethernet

The TPC-1240 is equipped with a 10Base-T Ethernet controller. To utilize it, change the device name when the TPC-1240 is first turned on.

Step 1. Click “Start/Settings/Control Panel”

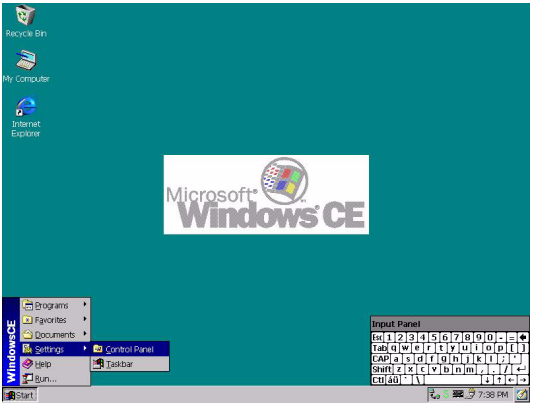

Figure 4.12: Control panel

Step 2. Double click “Communications”

Step 3. Find the default device name. Change it to a unique one depending on the plan of individual LANs.

Step 4. Use the utility mentioned in section 4.2.3 to save this changed name

Step 5. If the TPC-1240 is a node of a LAN with DHCP servers, it is now available.

Step 6. If the TPC-1240 is a node of a LAN with fixed IP server, please consult with MIS to get specific IP address. Click “Start/Settings/Control Panel”. Double click “Network” and update the IP address.

Step 7. Use the registry saving utility to save this changed name.

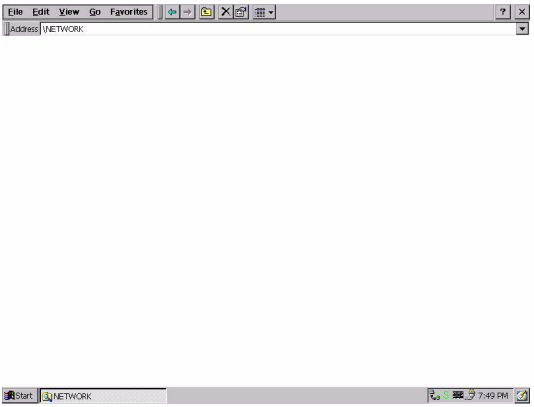

Figure 4.13: Networking by Windows Explorer

4.3.2 Networking via serial port

The TPC-1240 with built-in Windows CE supports serial connection to host computers. The host computer must install the Microsoft ActiveSync service offered by Microsoft. Use a null modem cable bundled with the TPC-1240 to connect the serial ports of the host computer and the TPC-1240. Then activate ActiveSync service on the host computer. The host will automatically scan its serial ports and make a connection.

Step 1. Make sure the Microsoft ActiveSync service and the Microsoft embedded Visual Tools are properly installed in the host PC.

Step 2. Connect the two RS-232 ports of the host PC and the TPC-1240 by a null modem cable.

Step 3. If users are using the Microsoft eMbedded Visual Tools to develop Windows CE application runtimes, make sure the TPC-1240 SDK provided in the TPC-1240 support CD is also properly installed in the host PC.

Step 4. Click "Start/Programs/Communication/Remote Networking"

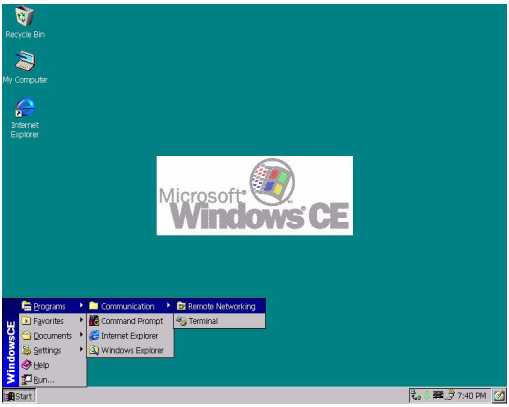

Figure 4.14: Remote Networking

Step 5. Make a new connection. As the dialogue box pops out, choose the default "Direct Connection".

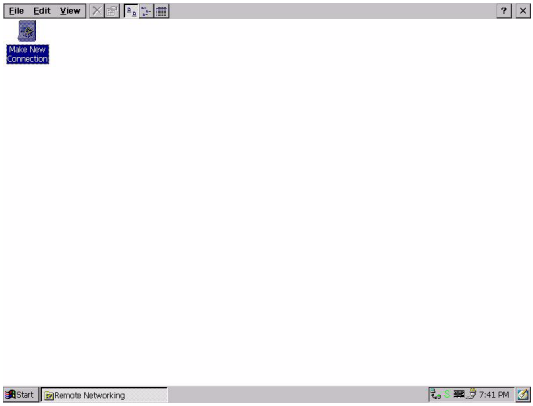

Figure 4.15: Make new connection

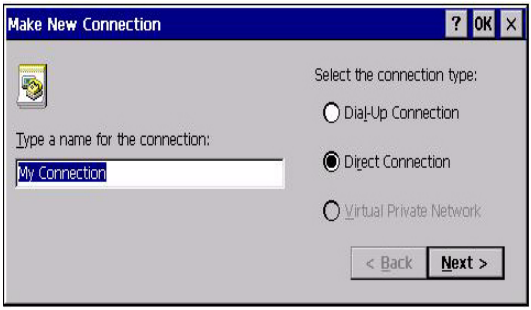

Figure 4.16: Direct connection

Step 6. Click "Next" and "Finish" to complete making new connection. It is recommended to keep the default settings of the serial ports connection.

Figure 4.17: default settings

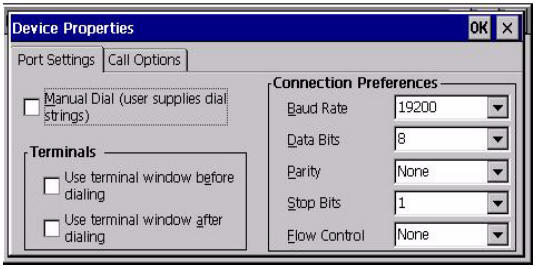

Figure 4.18: Default settings (cont)

Step 7. If the ActiveSync service on the host PC has been activated, the above six steps will make the TPC-1240 automatically try to connect the host.

Figure 4.19: Web browser on TPC-1240

4.3.3 Web browser

The TPC-1240 built-in Windows CE OS includes Microsoft IE Sample. It can be used to browse web pages on World Wide Web via LAN or dial-up connection.

4.4 Application program development

The TPC-1240 is bundled with built-in Windows CE operating system. In real applications users need to execute various application programs on it. However, unlike its other family the Windows CE is a hardware-dependent operating system. That is to say, Windows CE application programs

are only portable in the source code level. Users must rebuild the runtime file for a different Windows CE platform even though the source code may not be changed at all.

4.4.1 System requirements for developers

- Intel Pentium-90 CPU or more advanced
- Microsoft Windows 2000 Professional or Windows NT Workstation 4.0
- Microsoft eMbedded Visual Tools 3.0
- Platform SDK for TPC-1240 (bundled in the standard TPC-1240S-CE)
- 64 MB DRAM
- CD-ROM drive
- Monitor with VGA resolution at least
- Mouse
- 200 MB free hard disk space at least
- Connection to the same LAN as the TPC-1240 if LAN is used for development TPC-1240
- TPC-1240S-CE
- Connection to the same LAN as the host PC if LAN is used for development
- Null modem cable (bundled in the standard TPC-1240S-CE)

4.4.2 Building Windows CE Runtime

By the platform SDK bundled with the standard TPC-1240, users can build the Windows CE runtime by the eMbedded Visual Tools.

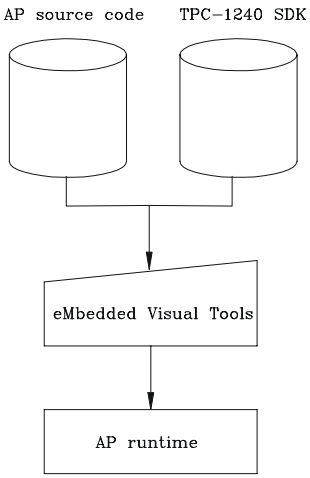

Figure 4.20: Flowchart of building Windows CE runtime

4.4.3 Startup Execution

The TPC-1240 has a useful function called "startup execution". After the system is finished booting up, the startup execution function would automatically be performed. This function is useful for control systems to do initialization processes or some other programs. On the TPC-1240, there are two ways to perform the "Starup" function.

Method 1: single execution program

Step 1. Create a "startup" directory on the CompactFlash card or on the IPSM if there is no CF used.

Step 2. Copy the executable file to the "startup" directory.

Example:

We copy an executable file "Xaudio.exe" in "\IPSM\Startup", and then reboot the system. Then Xaudio.exe will automatically execute.

Notice: *Do not put two or even more executable files on the startup directory. Under such circumstance the execution sequence is unpredictable.*

Method 2: multiple execution programs

Step 1. Create a "startup" directory on the CompactFlash card or on the IPSM if there is no CF used.

Step 2. Create a file called "startup.ini" in the "startup" directory. In this startup.ini type in the commands you want to execute as boot up.

Example:

Create "Startup.ini" in the "\IPSM\Startup" directory and reboot the system.

The content of startup.ini is listed below:

\windows\tty.exe

\windows\registry.exe

As the system reboots, "\windows\tty.exe" and "\windows\registry.exe" will execute automatically.

Notice: Do not use method 1 and 2 simultaneously. The sequence to execute programs would be unpredictable.

CHAPTER 5

Linux in the TPC-1240

Chapter 5 Linux in the TPC-1240

The TPC-1240 has optional package of Linux operating system. Cooperating with Avamax, the Linux package called "iCava" is available. This chapter discloses some briefing for it. Please refer to the iCava resource CD for more detailed technical reference.

5.1 Technology

iCava is a collection of software in such a way that it can be tailored for various kinds of Internet access devices. It consists of a micro-kernel OS, a flash file system, IC card support, multi-lingual multi-window GUI, TCP/IP protocols stack, Secure Socket Layer, PPP, Web Browser, MIME e-mail, NetMeeting compatible video phone with software CODEC, software MP3 player, MS Outlook-like PIM, spread sheet and HTML-based word processor

The iCava technology deals with:

1. accessing the Internet
2. un-compromised web browsing
3. multi-media communication
4. graphical user interface
5. embedded window management
6. embedded file management
7. hardware resource management
8. embedded data and information management

Figure 5.1 shows the structure of iCava

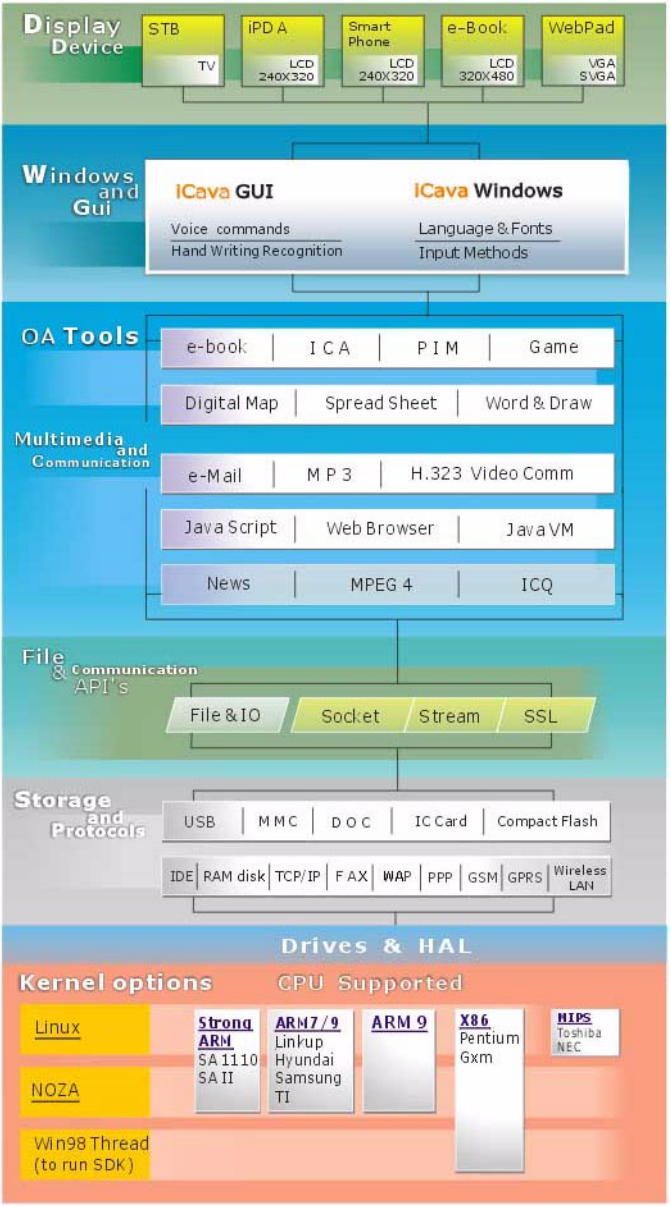

Figure 5.1: Structure of iCava

5.2 Linux components on the TPC-1240

Among the superior technologies of iCava, some of them are selected for the TPC-1240 so as to meet the requirements in the field of human machine interface. The components include:

1. Linux kernel version 2.4.3
2. gLibC version 2.2.1
3. Drivers:
   - SA1110 LCD driver
   - UCB1300 Touchscreen driver
   - PS/2 to SPI (Serial Protocol Interface) keyboard/mouse driver
   - CompactFlash support driver
   - SMC91C96 LAN driver
   - RS-232 serial port driver (COM1)
   - RS-485 serial port driver (COM2)

iCava GUI (Graphic User Interface):

The iCava GUI for 320 x 240 (QVGA) English version is built-in though the kernel looks like a command-line based OS. If users need the iCava GUI, the resource CD gives all necessary information about iCava API.

5.3 Boot Up the TPC-1240 with Linux

To keep the flexibility that Linux has, the TPC-1240 shows the Linux kernel only. The GUI is left to users for customizing. It is very possible that users have their own GUI, or they intend to develop their own GUI. The following is the step-by-step boot up procedure of the TPC-1240 with Linux.

Notice: ***Since Linux is a command-line based operating system, it is necessary for users to connect a keyboard to the TPC-1240 with Linux at the first time. As iCava or other GUI/window manager is installed, the touchscreen might take place of the keyboard.***

Step 1. Connect some 24 V_{DC} power source to the TPC-1240. Turn on the TPC-1240.

Step 2. An icon of penguin representing Linux appears. Then a testing utility activates. The first screen is for users to calibrate the touchscreen. After that, the utility turns out to be the screen which can help users to verify hardware functions. When this hardware testing utility is activating, users can press the F10 key on the keyboard to invoke the touchscreen calibration screen.

Step 3. As mentioned above, when the testing utility appears after touchscreen calibration and users leave the utility alone for a while, it would close automatically and get into the login screen.

Step 4. The screen shows a login message:

Advantech Login:

Type "root" as the login ID and press "Enter".

Step 5. The prompt is a "#". If users need to run the hardware testing utility (again), key in the command and "Enter" to execute.

#icava (enter)

Step 6. Again, if users do not enter the testing screen for several seconds, the utility will close automatically. If the touchscreen is to be calibrated, press the F10 key of the keyboard.

Step 7. There is another utility verifying the COM ports. There is one RS-232 and one RS-485 port on the TPC-1240. Connect COM1 and COM2 by null modem cable or Advantech ADAM-4520/4522 RS232 to RS485 converter. Type in the command "comtest" (enter).

Step 8. The utility then begins to test bi-directional data transmission between the two serial ports. If everything is fine, the test will stop after 115200 bps is verified.

Step 9. To show the local IP address, type the command "ifconfig" (enter).

Step 10. To test networking, type in the command in the command line:

#ping xxx.xxx.xxx.xxx (enter)

CHAPTER 6

System Tuning

From time to time it is necessary to tune system settings from the defaults. The most common ones are included in this chapter.

Chapter 6 System Tuning

6.1 LCD brightness tuning

The display brightness of the TPC-1240 is designed to be adjustable. There is an access opening at the rear case of this machine. Use a blade screwdriver to reach the variant resistor inside, and adjust the contrast to satisfactory level.

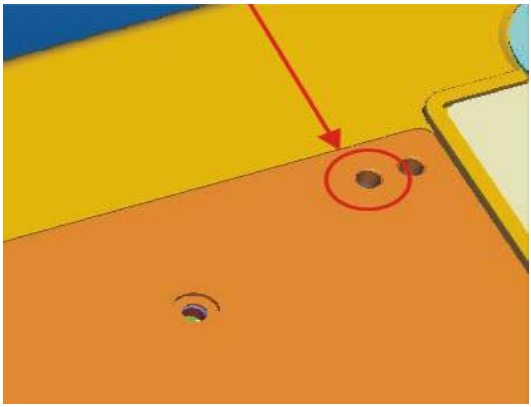

Figure 6.1: Adjust LCD brightness

6.2 Touchscreen calibration under Windows CE

The touchscreen calibration utility program is built in the Windows CE:

Step 1. From the Windows CE status bar, click “Start/Programs”

Step 2. Double-click “Windows Explorer”

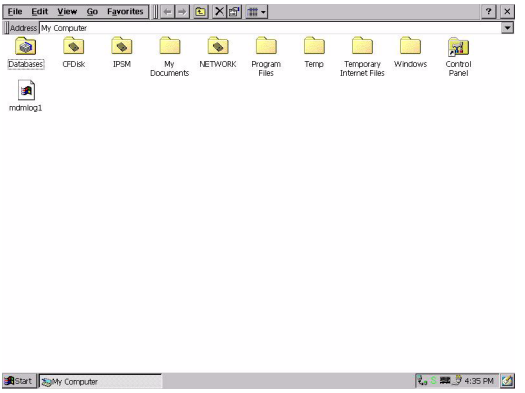

Figure 6.2: Double click “Windows explorer”

Step 3. Double-click “Control Panel”

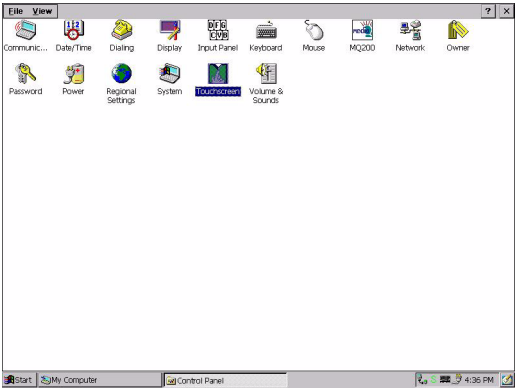

Figure 6.3: Control panel

Step 4. In the Control Panel window find the"Touchscreen" icon and double-click it.

Step 5. The calibration window pops out. Click the "Calibrate" button..

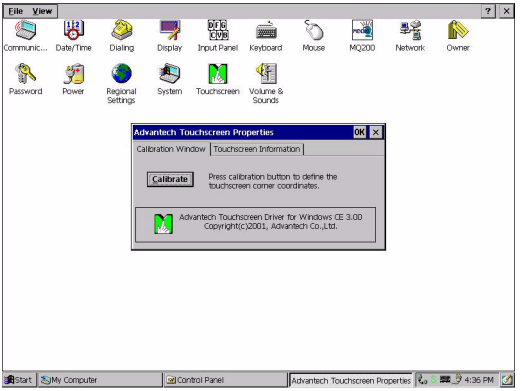

Figure 6.4: Calibration

Step 6. A calibration screen appears. Click the circle by a stylus or a finger.

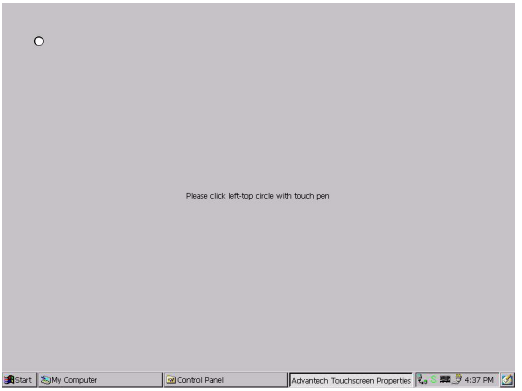

Figure 6.5: Calibration screen (1)

Step 7. The second calibration screen appears. Click the circle again.

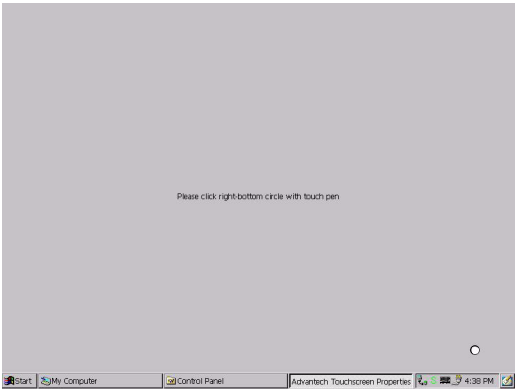

Figure 6.6: Calibration screen (2)

Step 8. Click "OK" to save the calibration results.

CHAPTER 7

Maintenance

In practice users may need on site maintenance. This chapter covers several simple repairings that can be done by qualified technicians.

Chapter 7 Maintenance

The TPC-1240 is designed to be modular, slim and lightweight for easier maintenance. The following sections are dedicated to describe how a qualified technician can replace major components._

7.1 CPU board replacement

Step 1. Remove the screw on the CPU board cover.

Step 2. Slide the CPU board cover toward the opposite side of the I/O ports.

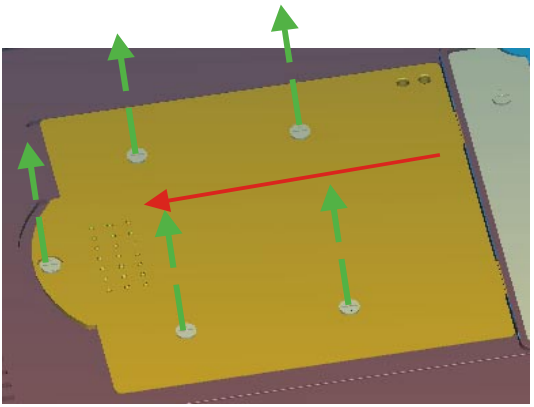

Figure 7.1: CPU board cover

Step 3. Remove the CPU board cover.

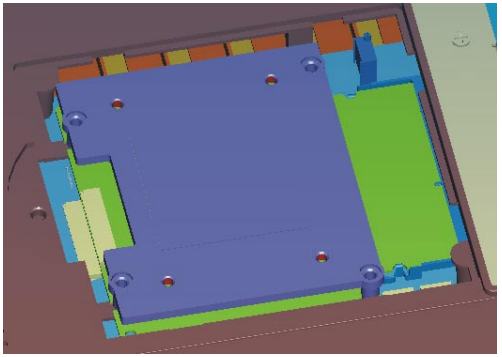

Figure 7.2: Remove the CPU board cover

Step 4. The CPU board is now visible. It connects to the I/O board by a 144-pin SO-DIMM connector and a 20-pin FPC connector.

Step 5. Use a pair of tweezers to loosen the 20-pin FPC connector, and release the FPC.

Step 6. Bend outward the two metal latches of the SO-DIMM connector by your thumbs. The free end of the CPU board would swing up. Pull out the CPU board.

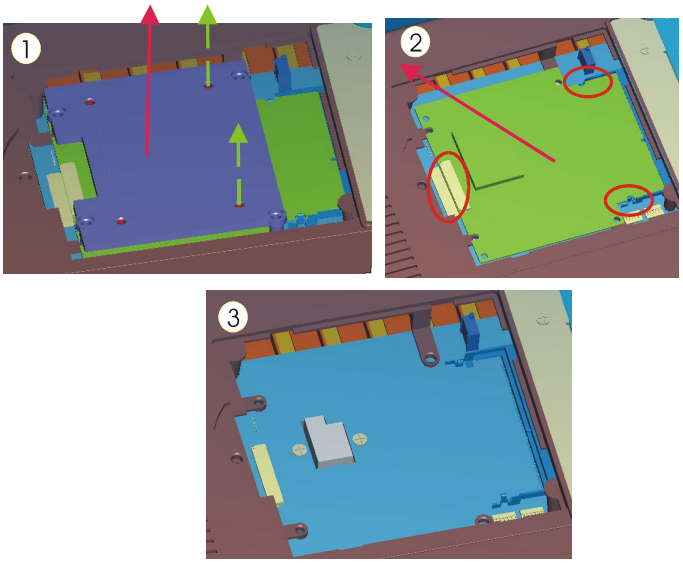

Figure 7.3: Remove the CPU board

Step 7. Insert a new CPU board to the SO-DIMM connector.

Step 8. Push down and lock the CPU board.

Step 9. Use a pair of tweezers to insert the 20-pin FPC to the connector on the CPU board. Then tighten the connector.

Step 10. Replace the CPU board cover and fasten the screw.

7.2 Fuse replacement

Step 1. Remove the fuse cover.

Step 2. Replace the damaged fuse with a new one.

Step 3. Replace the fuse cover.

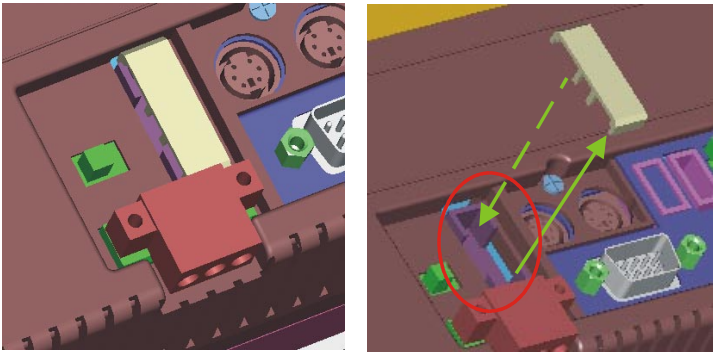

Figure 7.4: Replace the fuse.

Warning: *1. Do not replace the fuse unless it is damaged*
2. Do not replace the fuse with a fuse with a different rating.

Appendix A

Fuse Specifications

Appendix A Fuse specifications

A.1 Supported Input Timing Modes

The fuse used on the TPC-1240 is:

Rating: 250 V_{AC}, 5 A

Size: 5 x 20 mm

Appendix B

Registry searching sequence of TPC-1240

Appendix B Registry searching sequence of TPC-1240

B.1 Supported Input Timing Modes

When the TPC-1240 is turned on, the Windows CE will search for registry to load those important system parameters. There are three alternatives to save the registry: registry file on the external CompactFlash memory card, registry file on the built-in flash memory or default registry settings in the Windows CE image file. Figure B.1 shows how TPC-1240 searches for the registry.

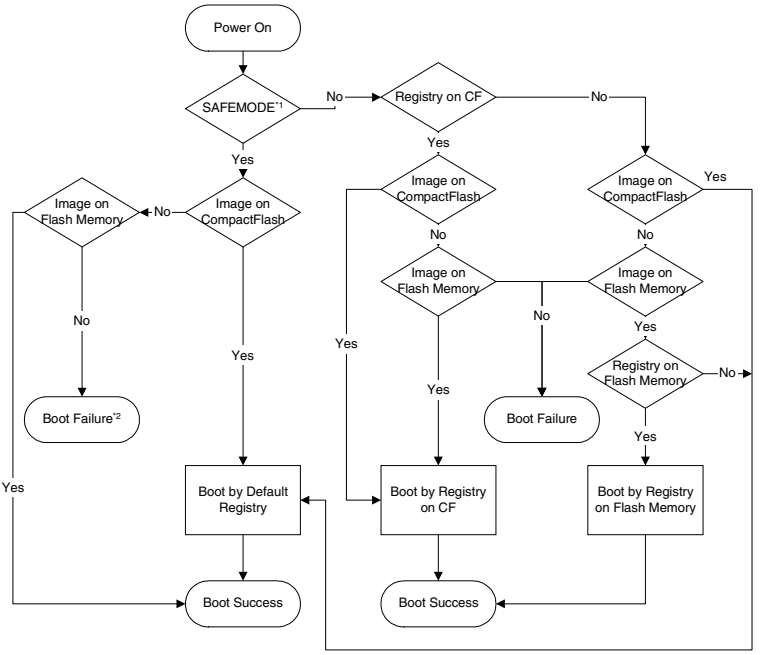

Figure B.1: Windows CE registry searching algorithm flowchart

Remark:

1. *"SAFEMODE" implies a folder or an empty file named "safemode" on the CF. Users can create this by themselves as the registry on the flash memory might corrupt. Thus the bootup will skip the registry on the flash memory.*
2. *"Boot Failure" means the TPC-1240 fails to find necessary information. The system will halt.*